Development Services Department
Division of Building, Construction and Safety

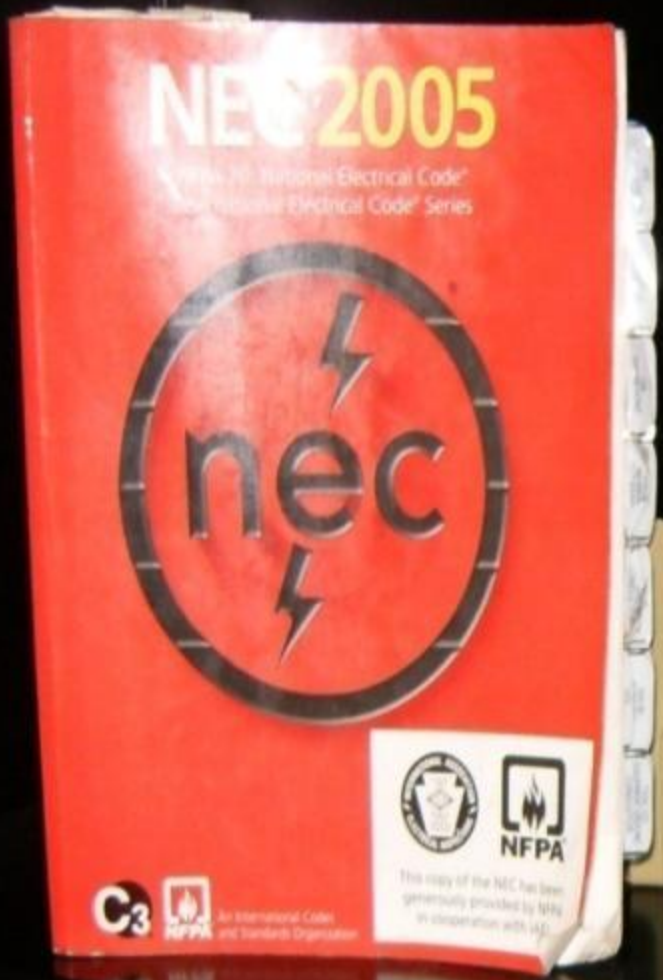
Inspection Guidelines and Suggested Practices

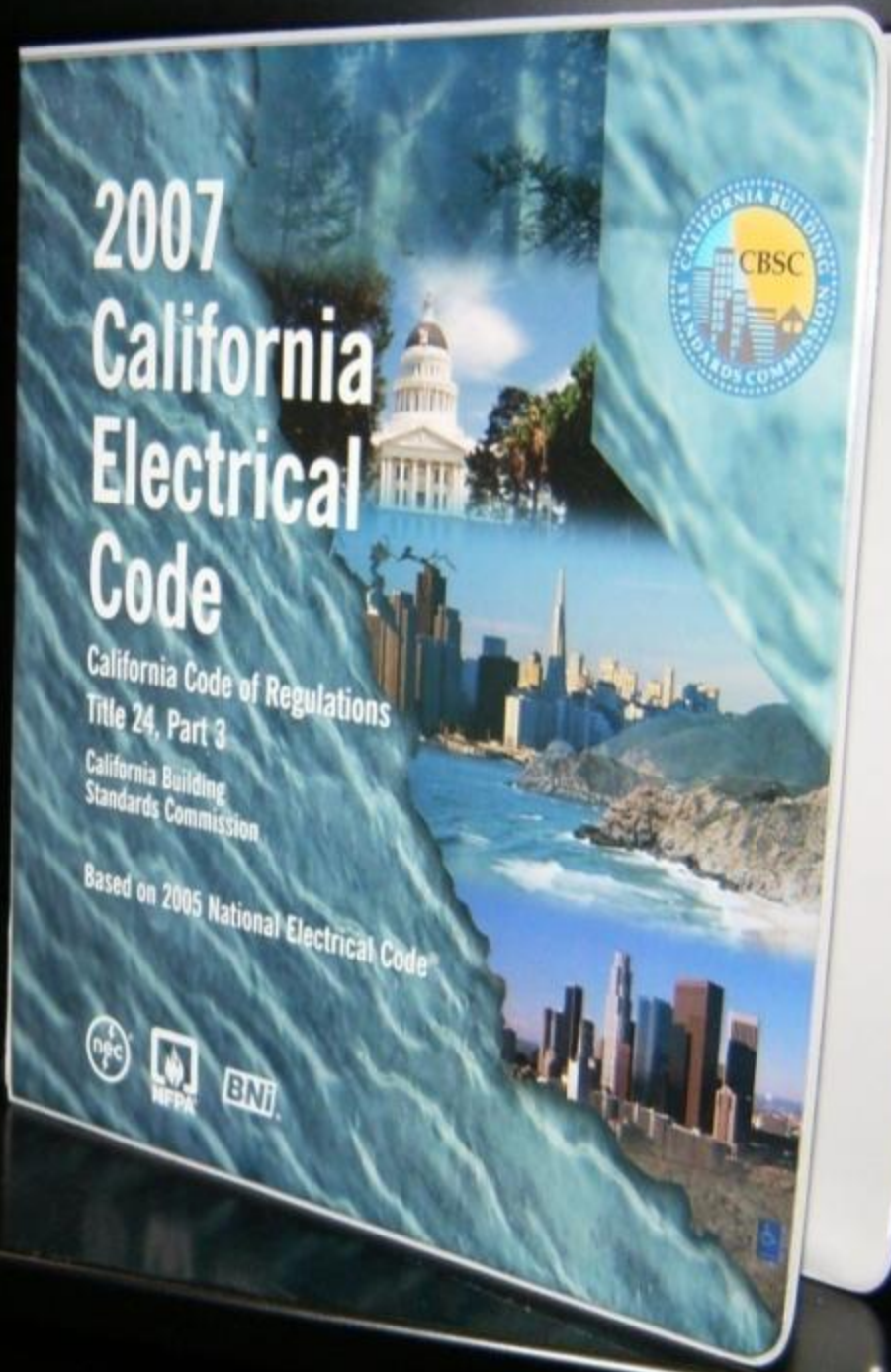
Inspection Process

- To verify that the installation is in conformance with the design of the approved set of plans
- To verify that the installation is in compliance with the California Electrical Code and other applicable codes and regulations

Purpose of the Code

"….the practical safeguarding of persons and property from hazards arising from the use of electricity"


NEC 2005
nec
NFPA


2007
California
Electrical
Code
California Code of Regulations
Title 24, Part 3
California Building
Standards Commission
Based on 2005 National Electrical Code
CBSC
NFPA
BNi

2010 California Electrical Code – effective date – January 1, 2011

Bases on the 2008 National Electrical Code

Inspection Process

- Contractor/owner responsibility to schedule and coordinate all required inspections
- Responsible party on site
- Provide access to all elements of system installation

Inspection

- Ground-mounted
  1. footings for array frame
  2. underground raceways
  3. final

Observe regulations for -

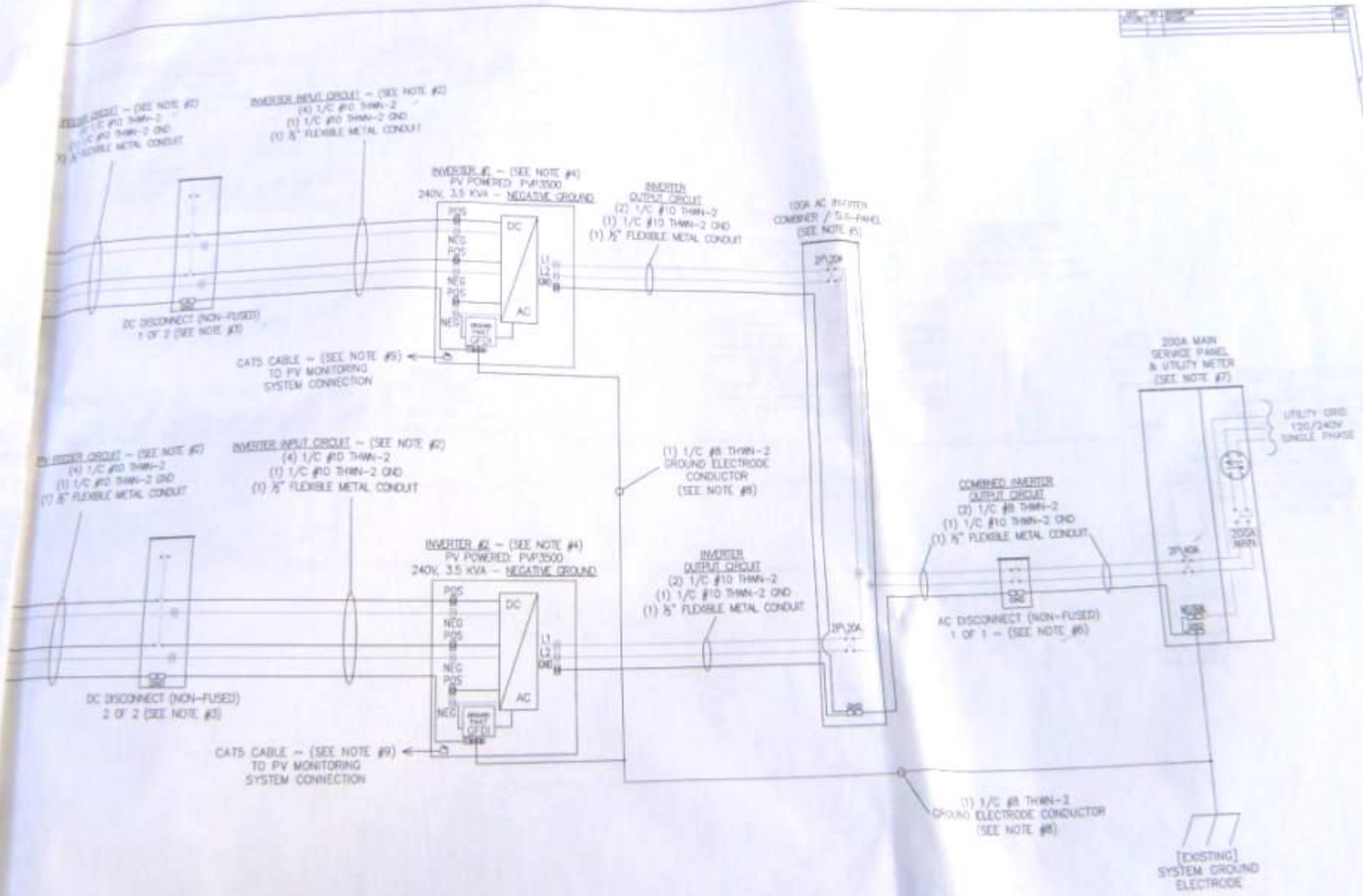
Brush Management Zones, Environmentally Sensitive Lands, and Multiple Habitat Planning Areas

Inspection (continued)

- Roof mounted arrays
  - Rough electrical (for any concealed work)
  - Roof array and bond (for integrated systems or for tile roofs)
  - Final inspection

Necessary Paperwork on Site

- Approved plans
- Inspection record card (DS-1798)
- Manufacturer's Installation instructions – modules, racking, inverter


INVERTER INPUT CIRCUIT – (SEE NOTE #2)
(4) 1/C #10 THWN-2
(1) 1/C #10 THWN-2 GND
(1) ¾" FLEXIBLE METAL CONDUIT
INVERTER #1 – (SEE NOTE #4)
PV POWERED PVP3500
240V, 3.5 KVA – NEGATIVE GROUND
POS
NEG
POS
NEG
DC
AC
L1
L2
GND
INVERTER
OUTPUT CIRCUIT
(2) 1/C #10 THWN-2
(1) 1/C #10 THWN-2 GND
(1) ¾" FLEXIBLE METAL CONDUIT
120A AC INVERTER
COMBINER / SUB-PANEL
(SEE NOTE #5)
2P,20A
DC DISCONNECT (NON-FUSED)
1 OF 2 (SEE NOTE #3)
CAT5 CABLE – (SEE NOTE #9)
TO PV MONITORING
SYSTEM CONNECTION
INVERTER INPUT CIRCUIT – (SEE NOTE #2)
(4) 1/C #10 THWN-2
(1) 1/C #10 THWN-2 GND
(1) ¾" FLEXIBLE METAL CONDUIT
(1) 1/C #8 THWN-2
GROUND ELECTRODE
CONDUCTOR
(SEE NOTE #8)
INVERTER #2 – (SEE NOTE #4)
PV POWERED PVP3500
240V, 3.5 KVA – NEGATIVE GROUND
INVERTER
OUTPUT CIRCUIT
(2) 1/C #10 THWN-2
(1) 1/C #10 THWN-2 GND
(1) ¾" FLEXIBLE METAL CONDUIT
2P,20A
DC DISCONNECT (NON-FUSED)
2 OF 2 (SEE NOTE #3)
CAT5 CABLE – (SEE NOTE #9)
TO PV MONITORING
SYSTEM CONNECTION
COMBINED INVERTER
OUTPUT CIRCUIT
(2) 1/C #8 THWN-2
(1) 1/C #10 THWN-2 GND
(1) ¾" FLEXIBLE METAL CONDUIT
AC DISCONNECT (NON-FUSED)
1 OF 1 – (SEE NOTE #6)
200A MAIN
SERVICE PANEL
& UTILITY METER
(SEE NOTE #7)
200A
MAIN
UTILITY GRID
120/240V
SINGLE PHASE
(1) 1/C #8 THWN-2
GROUND ELECTRODE CONDUCTOR
(SEE NOTE #8)
[EXISTING]
SYSTEM GROUND
ELECTRODE

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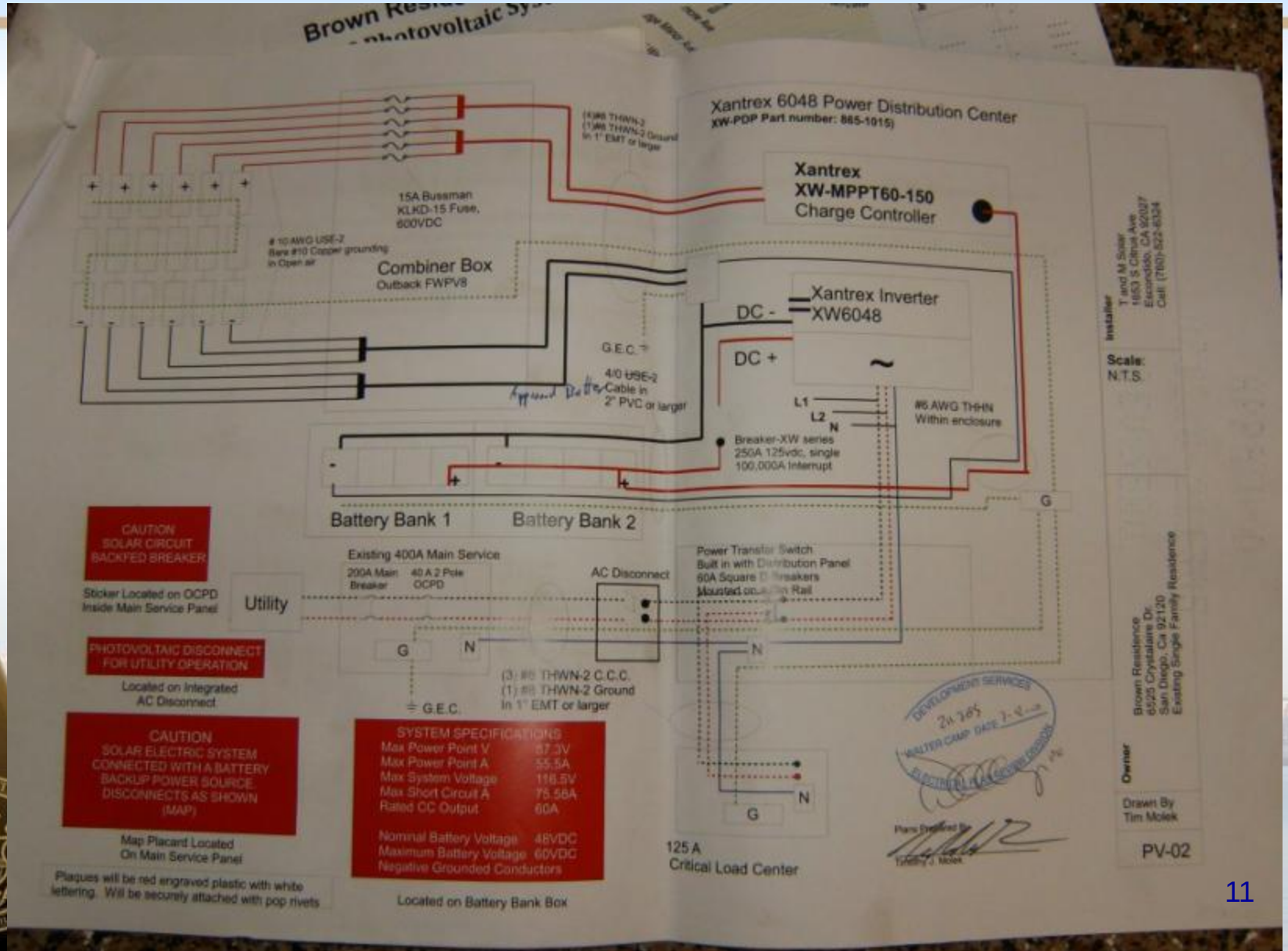
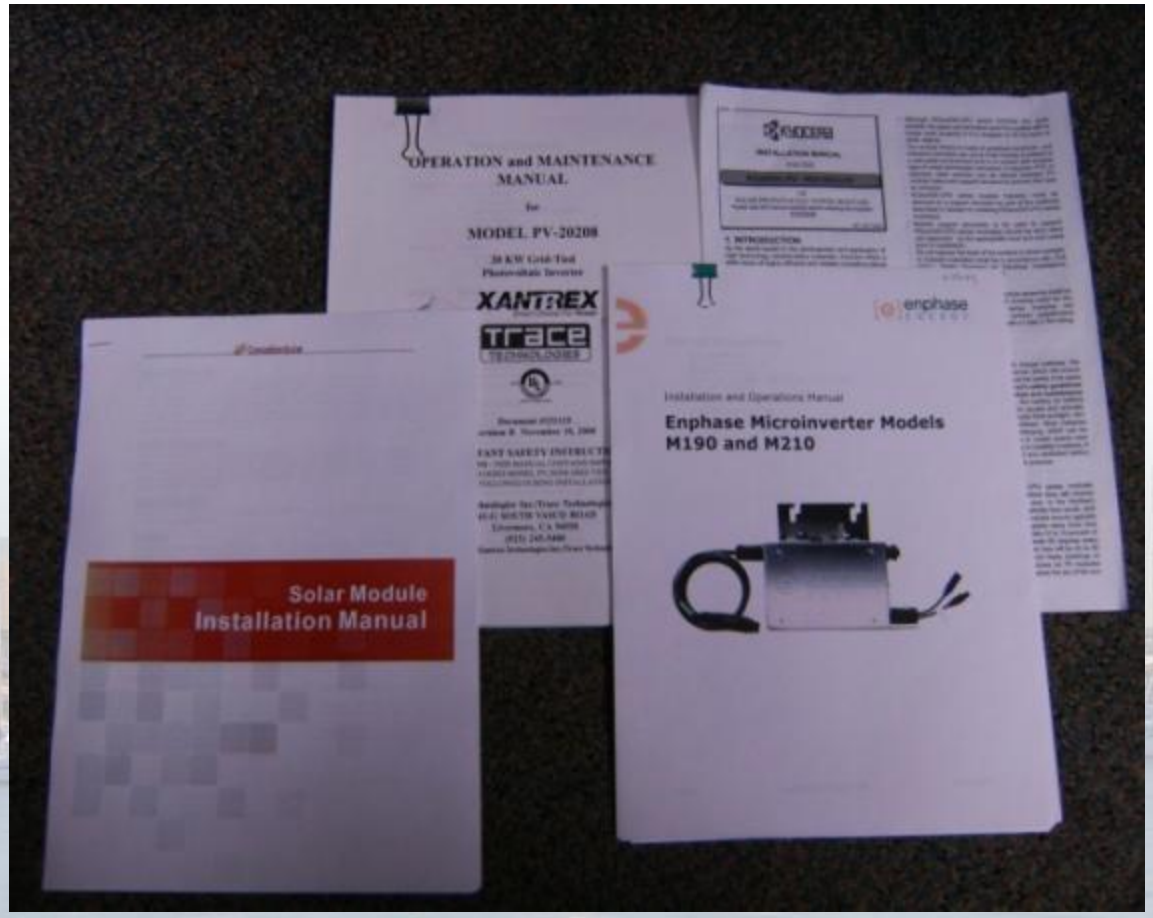


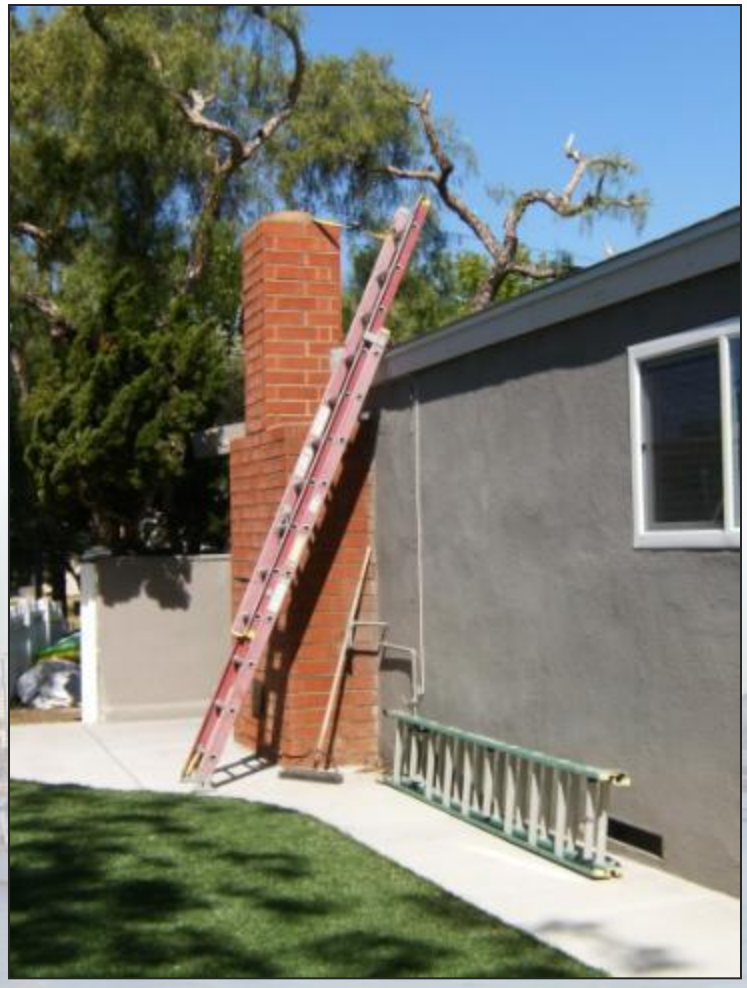
Installation manuals – inverters, modules



Roof Mounted Systems

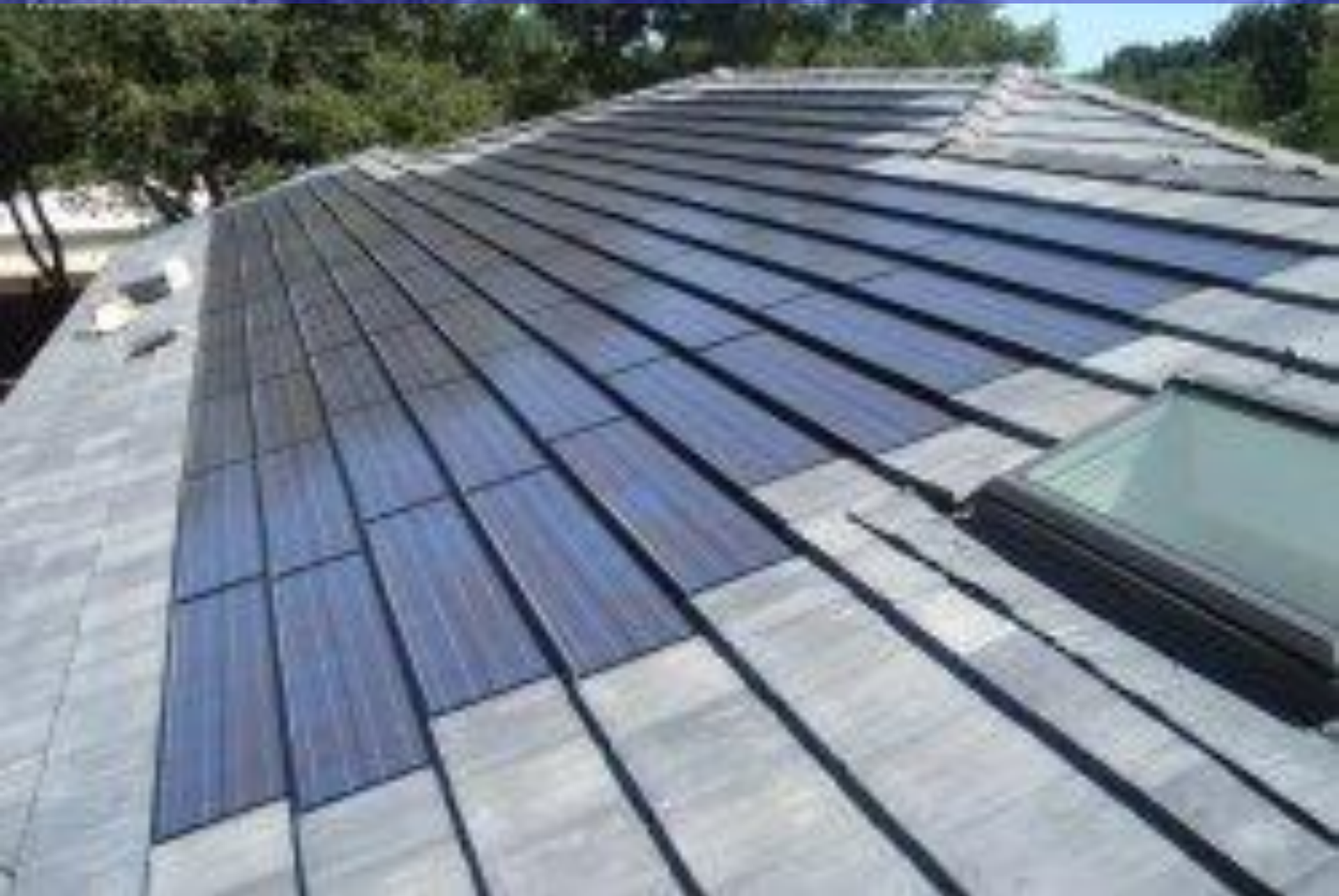
Roof Access

- Cal -OSHA Compliant Ladder
- Sitting squarely on level surface
- Secured at top



Tile roofs

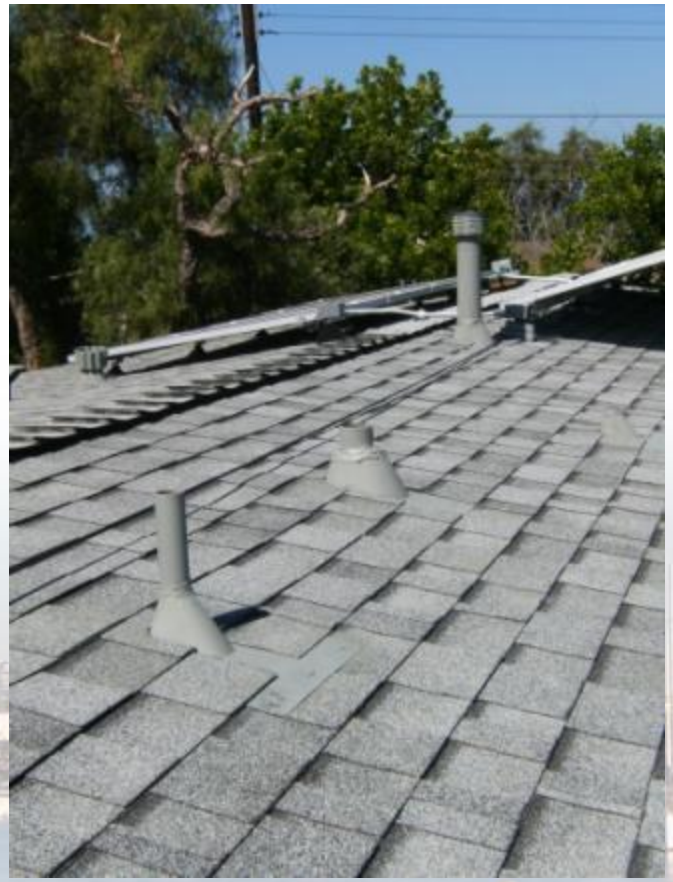
Building Integrated PV



Racking Installation

Flashing and Weather Protection

Clearance to Vents



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Plumbing Vents

- Plumbing vents cannot be covered by module installation
- Vents shall terminate a minimum of
- 6” above or 1’ away horizontally from adjacent PV modules
- Termination shall not be higher that the highest point of the existing roof
- Vents less than 3” can be extended /offset but shall be properly and independently supported
- All extensions shall meet the requirements of the California Plumbing Code
- Extension on any plumbing vent 3” diameter or larger is not allowed

Using Identified grounding points and approved devices and materials

Combiner Boxes, Junction Boxes and Wiring Methods

- Listed equipment
- Installed per manufacturer's installation instructions
- Cable Management
- Conduit support

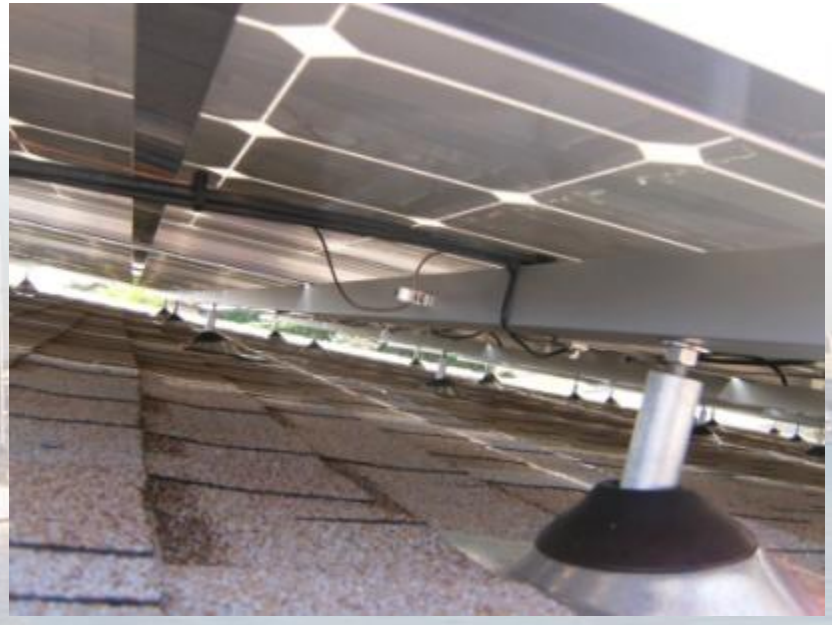
Combiner boxes, wiring method

Listed Combiner Box providing string protection – correctly mounted and installed

Junction boxes, conduit support

Wiring methods and materials

Cable Management



Inverters and DC Disconnects

- Listed utility interactive inverters
- As-built conforms to the design
- Installed per manufacturer's installation instructions or recommendations
- System grounding electrode conductor properly terminated

Listed Utility-Interactive Inverter

Conductor terminations

Inverter locations

Service Equipment

- bus rating
- existing main overcurrent protection
- PV overcurrent protection
- manufacturer breakers
- cable or conduit entry
- labeling
- multiwire branch circuit relocation and balanced load on bus
- grounding system


3951
CAUT
POWER TO THIS BUILDIN
FROM PHOTO VOLTAIC
LOCATED AS

PV breakers and existing multi-wire circuits

Service Upgrades involving Scheduled Outages with SDG&E

- Schedule DSD inspection for day of the scheduled outage
- Contact the inspector re: time frame
- Equipment installed,
- framing weather-protected,
- grounded,
- service entrance raceway or riser and service entrance conductors installed

Ready for reconnection?

Grounding

- Verify acceptable grounding for existing service equipment or provide a supplemental electrode
- Provide service and system grounding compliant with the Code

Water piping ground must be supplemented

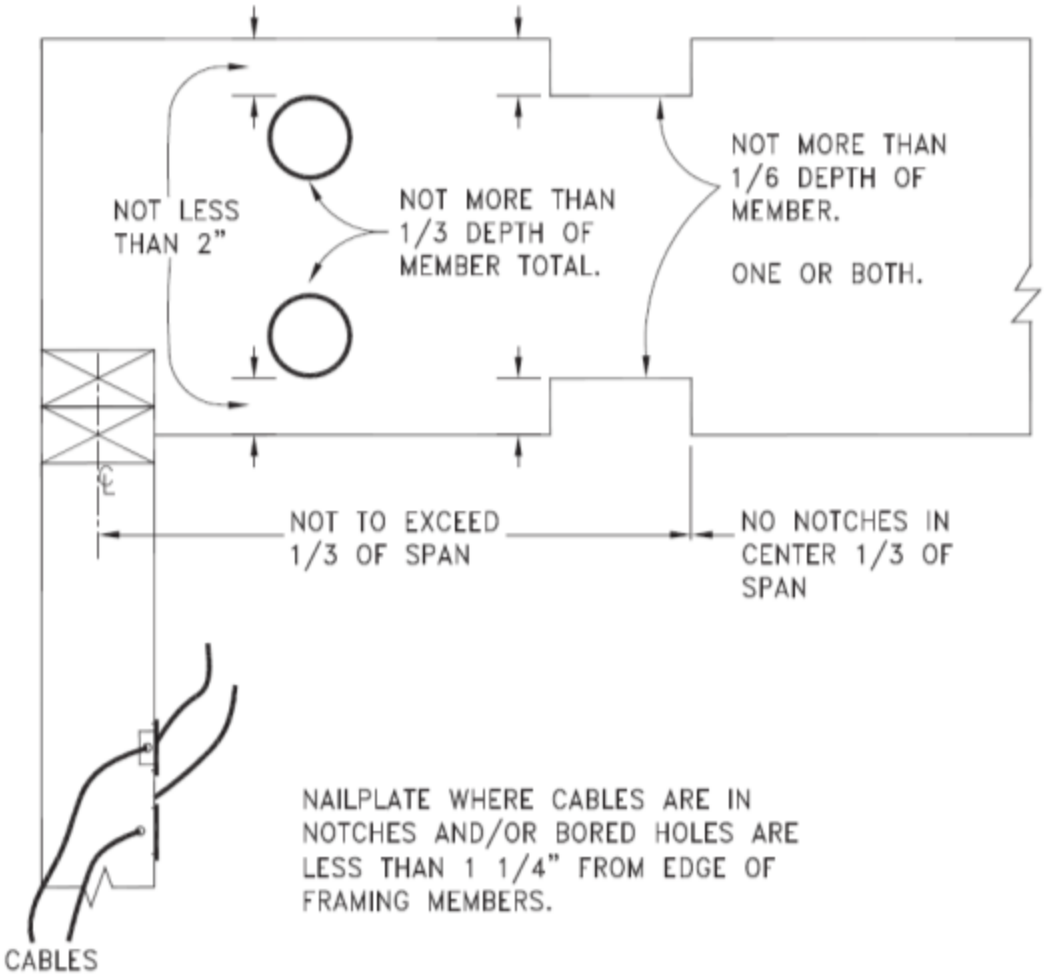
Driven Ground Rod

DC and AC wiring through a structure

CAUTION – Notching and Boring Wood Members


Load-bearing 2 x 12 floor joists @ 12” OC
notched in middle 1/3 of span

NOTCHING & BORING WOOD FRAME MEMBERS



NAILPLATE WHERE CABLES ARE IN NOTCHES AND/OR BORED HOLES ARE LESS THAN 1 1/4" FROM EDGE OF FRAMING MEMBERS.

EXTERIOR AND/OR BEARING WALL MEMBERS SHALL NOT BE NOTCHED MORE THAN 25% OR BORED MORE THAN 40%. BORED HOLES MUST BE 5/8" MINIMUM TO EDGE OF FRAMING MEMBER.

Properly fire stop around all penetrations of rated assemblies

Signage and Placarding

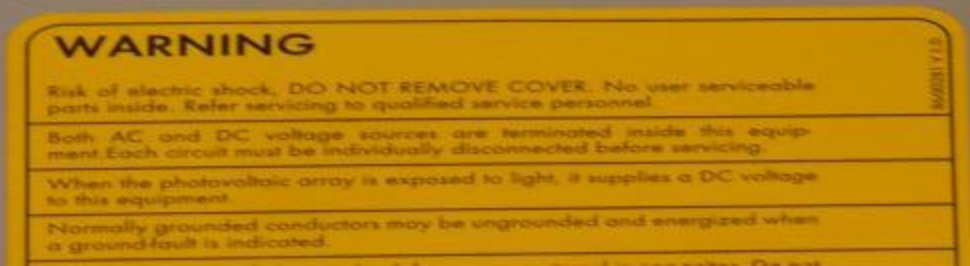
- Alternate power source placard
- DC raceways and DC disconnects
- Cautionary
- Site specific design
- PV disconnect for utility operation

Alternate Power Source Placard


CAUTION: SOLAR CIRCUIT
PHOTOVOLTAIC DC DISCONNECT
CAUTION!
PHOTOVOLTAIC ARRAY DC DISCONNECT
PHOTOVOLTAIC DISCONNECT FOR UTILITY OPERATION

SYSTEM CHARACTERISTICS

SYSTEM SIZE:	8.6	kW
SYSTEM OPEN CIRCUIT VOLTAGE:	466.4	V dc
SYSTEM OPERATING VOLTAGE:	336	V dc
MAXIMUM ALLOWABLE DC VOLTAGE:	600	V dc
SYSTEM OPERATING CURRENT:	25.6	Amps
SYSTEM SHORT CIRCUIT CURRENT:	36	Amps




CAUTION
DC POWER
DO NOT REMOVE
CAUTION
DC POWER
DO NOT REMOVE

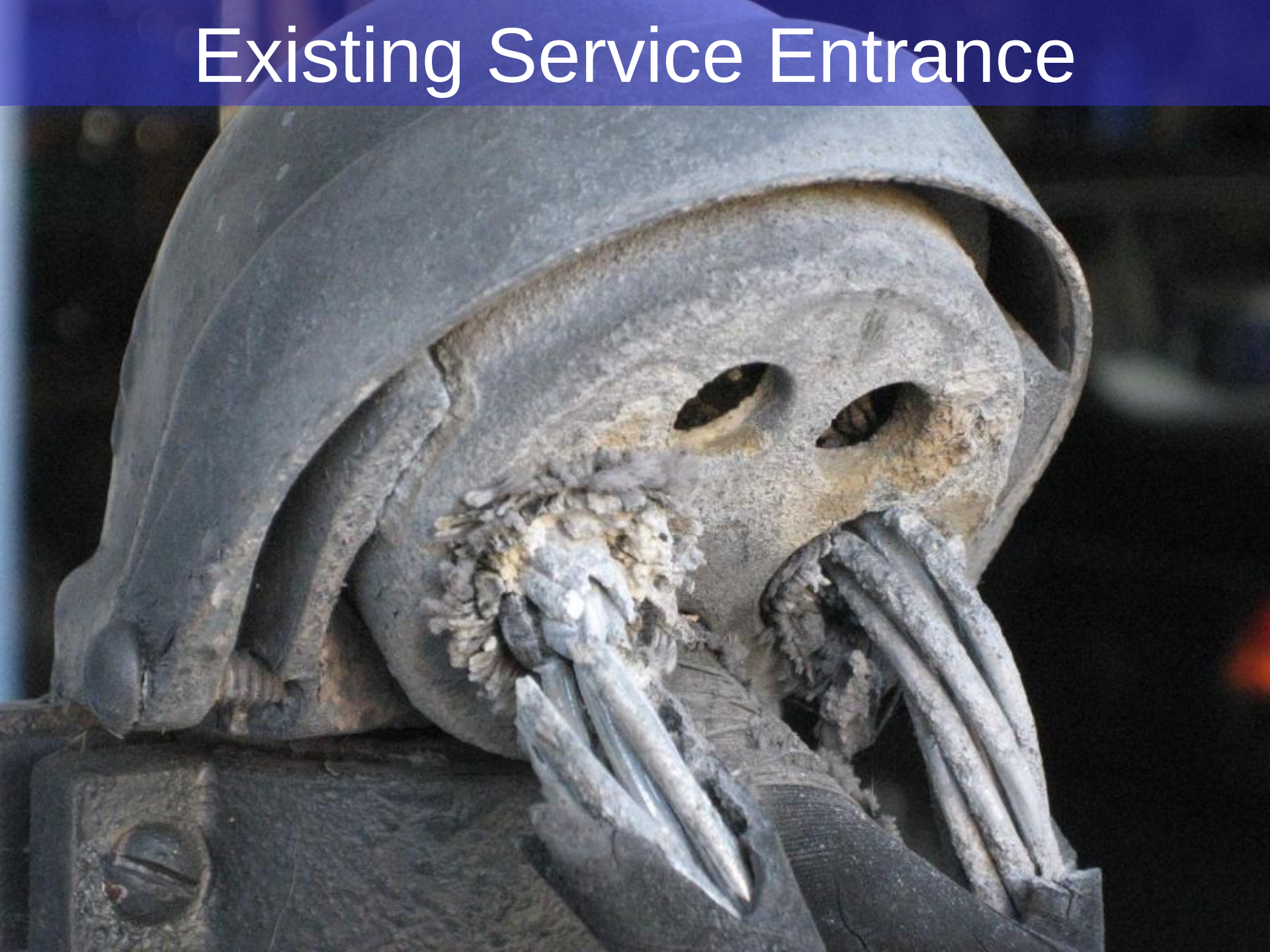
Suggested practices

- Survey the site – verify the adequacy and condition of the existing electrical system to accommodate a PV system
- A service upgrade or other corrections may be required

Inadequate work space

Service Disconnects – Maximum Six Handles without a Main Disconnect

Existing Service Entrance



Existing service

Service supplied by SIDA cable

Alternative Energy Systems installed with safeguarding life and property in mind

Questions?